Conceptual Capacity and Officer Effectiveness

Philip M. Lewis
Auburn University

Research and Advanced Concepts Office
Michael Drillings, Acting Director

February 1996

19960604 063

United States Army
Research Institute for the Behavioral and Social Sciences

DTIC QUALITY INSPECTED 1

U.S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency Under the Jurisdiction
of the Deputy Chief of Staff for Personnel

EDGAR M. JOHNSON
Director

Research accomplished under contract
for the Department of the Army

Auburn University

NOTICES

REPORT DOCUMENTATION PAGE

1. REPORT DATE 1996, February	2. REPORT TYPE Final	3. DATES COVERED (from. . . to) September 1991-September 1992

4. TITLE AND SUBTITLE Conceptual Capacity and Officer Effectiveness	5a. CONTRACT OR GRANT NUMBER MDA903-91-C-0083
	5b. PROGRAM ELEMENT NUMBER 0601102A

6. AUTHOR(S) Philip M. Lewis (Auburn University)	5c. PROJECT NUMBER B74F
	5d. TASK NUMBER 2901
	5e. WORK UNIT NUMBER C57

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Auburn University Office of the Vice President of Research 202 Samford Hall Auburn University, AL 36849-5112	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: PERI-BR 5001 Eisenhower Avenue Alexandria, VA 22333-5600	10. MONITOR ACRONYM ARI
	11. MONITOR REPORT NUMBER Research Note 96-26

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

COR Michael Drillings

14. ABSTRACT *(Maximum 200 words):*

Individual differences in conceptual capacity were explored in an opportunity sample of 44 War College students. Replicating earlier findings, War College students demonstrated a range of conceptual capability, in particular with respect to breadth of perspective (Keagan, 1994) and conceptual work capacity (Jaques, 1989). Ratings of these two conceptual capacities were once again found to be positively correlated, and conceptual work capacity was positively correlated with War College instructor ratings of strategic thinking skill but not rated peer popularity. Interrater reliability of the two conceptual capability measures was established. Implications of these findings for leader assessment and development were discussed.

15. SUBJECT TERMS

Conceptual skills	Strategic leadership	Assessment
Stratified systems theory	Constructive development theory	Breadth of perspective

SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON (Name and Telephone Number)
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified	Unlimited	44	

ACKNOWLEDGMENTS

CONCEPTUAL CAPACITY AND OFFICER EFFECTIVENESS

EXECUTIVE SUMMARY

Research Requirement:

The present research was performed to increase our understanding of the nature of individual differences in officer conceptual capability. In particular, two approaches to the assessment of War College students' levels of conceptual development were explored, both of which are thought to be implicated in officer effectiveness.

Procedure:

Forty-four War College students, enrolled at either the U.S. Army War College or the Industrial College of the Armed Forces, participated in individual assessment interviews designed to determine their breadth of perspective and conceptual work capability. In addition, the strategic thinking skill, general officer potential, and peer popularity of a subsample of these students was rated by seminar group instructors well acquainted with their conceptual skills. The interrater reliability of the two assessment procedures was assessed by having outside experts score a subsample of the assessment interviews and then comparing those scores with scores assigned by the principal investigator.

Findings:

The interrater reliability of both the breadth of perspective assessment procedure and the conceptual work capability assessment procedure was acceptable (.92 and .81, respectively). As was found in the principal investigator's previous War College research, there was a range of capability demonstrated. Only 56% of the students were found to be capable of fully exercising a self-authored perspective on key events in their work lives. With respect to conceptual work capability, a larger proportion (71%) demonstrated the conceptual capability thought to be necessary to fully comprehend the complexity of the work they would likely encounter upon leaving the War College. Despite the conceptual and methodological distinctiveness of the two approaches, scores from the two conceptual level assessments were positively correlated ($r = .46$). Inspection of the scatter plot showing the relationship among the two sets of scores suggested that a self-authored perspective may be necessary for the development of a complex understanding of one's work requirements. Seminar group instructors' ratings of students' strategic thinking skills and general officer potential were consistently and positively correlated with investigator-assessed conceptual work capability but not breadth of perspective. And, as expected, neither measure of conceptual capability was correlated with instructor ratings of War College students' peer popularity.

Utilization of Findings:

Both breadth of perspective and conceptual work capability appear to be promising candidates for components of a comprehensive assessment of officer capability. It appears that not all War College students, at the beginning of their resident course, possess these capabilities at a level that will be required by subsequent assignments at senior ranks. The impact of the War College experience on these conceptual skills should be assessed as should the relationship of these conceptual capabilities to officers' subsequent performance.

CONCEPTUAL CAPACITY AND OFFICER EFFECTIVENESS

CONTENTS

LIST OF TABLES

CONTENTS (Continued)

LIST OF FIGURES

CONCEPTUAL CAPACITY AND OFFICER EFFECTIVENESS

INTRODUCTION

The present investigation of the conceptual capability of mid level military officers is grounded in two interrelated assumptions about organizational leadership. The first is that leadership task requirements in complex, hierarchically structured organizations show progressive increases in complexity as one moves from lower to higher organizational levels (Jaques, 1976; Katz & Kahn, 1966; Mintzberg, 1973; Simon, 1977). The second major assumption is that successful performance of the critical leadership tasks of each successive organizational level depends upon the leader's conceptual capacity. Leaders who lack the conceptual capacity to grasp the complexity of the work at their respective organizational level are unlikely to succeed in their leadership roles (Jaques & Clement, 1991, Lewis & Jacobs, 1992). Anecdotal support for these two assumptions comes from several sources (e.g., Bennis & Nanus, 1985; Isenberg, 1985; Tichy & Devanna, 1986; Torbert, 1987). Modest empirical support was obtained in two prospective studies of private sector managers (Bentz, 1986; Bray, Campbell, & Grant, 1974). Bray et al. (1974) found that intelligence assessed early in one's career is predictive of subsequent managerial effectiveness. And Bentz (1987) concluded that there are qualitative as well as quantitative shifts in the nature of managerial work as one moves from lower to higher organizational levels. The centrality of conceptual capacity to managerial effectiveness was also demonstrated in a recent meta-analysis by Lord, DeVader, and Alliger (1986). Finally, Mumford and Connelly's (1991) review of the role of what they term "creative problem solving" in leader success provides further strong theoretical and empirical support for the importance of conceptual capability in leader effectiveness.

In the military context, support for assumptions about progressive role and leader complexity comes chiefly from a series of studies of task requirements at senior military ranks (Jacobs & Jaques, 1990; Jaques, Clement, Rigby, & Jacobs, 1986; Lucas & Markessini, 1993). In these studies, Army general officers at successively higher ranks increasingly identified complex cognitive skills as essential to their success. More recently, Forsythe et al. (1995) explored the "tacit knowledge" of three lower levels of military command (platoon, company, and battalion) and documented qualitative shifts in leaders' key concerns at progressively higher levels of command. Whereas platoon leaders were primarily focused upon interpersonal issues (motivating subordinates, establishing personal credibility), company commanders were concerned about issues of coordination and the balancing of subordinate and institutional interests. At the battalion level, commanders' tacit knowledge was primarily focused on the larger system (protecting the organization and managing organizational change).

Taken as a whole, this body of theoretical and empirical work supports both the premise that there are qualitative shifts in work complexity as one moves up an organization's hierarchy and the related premise that individual capability for mastering that work complexity is implicated in leader success. What is needed now is research which further clarifies both the nature of successive levels of work complexity and the nature of successive shifts in the individual capability needed to do that work. The present project focused on the latter, the

nature of individual work capability, in particular, certain broad cognitive aspects of that capability.

The Conceptual Requirements of Managerial Work

By far the most comprehensive and integrative view of the way in which managerial work increases in complexity as one proceeds up the organizational hierarchy is provided by Elliott Jaques and his colleagues (Jacobs & Jaques, 1987, 1990; Jaques, 1989; Jaques & Clement, 1991). The strength of this body of work comes from an integration of research into the nature of managerial work with a comprehensive theory of organizational hierarchy. Drawing on the earlier work of Jaques (1976), these authors point out that in requisitely configured organizations (those having neither too few nor too many organizational levels or layers) " . . . each successively higher level poses new conceptual skill requirements, largely based on the need to understand the causal factors which must be considered in making decisions" (Jacobs & Jaques, 1991). For example, in contrast to managerial work at the level of "direct" or supervisory leadership, at middle and upper organizational levels managers are much less involved in the direct supervision of subordinates. Instead, their efforts entail a greater reliance upon indirect influence through the management of climate, policy, and resource allocation. Together with the need for coordination of multiple subordinate units and multiple, simultaneous activities over extended periods of time, the conceptual requirements placed on managers at middle and upper organizational levels are thought to be qualitatively different from the requirements at lower levels.

At the highest organizational levels, the so-called "executive" or "strategic" levels of leadership (Jacobs & Lewis, 1992), the conceptual requirements are thought to undergo yet another qualitative shift in complexity. At these highest organizational levels, leaders must understand and influence interconnected political, economic, sociocultural, and technological variables, anticipate the future, develop resources, and influence corporate culture and values. While it is possible to quibble about just how many qualitatively different organizational levels there are in a given organization, it seems clear that such levels exist and have implications for the conceptual requirements of associated leadership roles. With respect to the focus of the present research on mid-level military officers, it seems safe to assume that the transition from direct leadership (platoon and company command, and most battalion commands) to indirect leadership (brigade and division command) entails more than just a substantial increase in the scale and scope of the commander's responsibilities. More fundamentally, the transition also entails a qualitative shift in the conceptual demands of the required work.

That the shift from direct to indirect leadership likely entails significant qualitative increases in conceptual requirements has several important implications. One is that success as a direct leader or manager may not be a particularly good predictor of success as an indirect leader or manager. Focusing on the U.S. Army as an example, some competent battalion commanders (the highest level of direct leadership according to Jaques, (1989)) may lack the conceptual capacity to succeed at higher command levels. To predict success at the

2

next level of organizational leadership, it would appear to be necessary to directly assess the leader's conceptual capacity to see if it meets or exceeds the conceptual requirements of the higher level. Indeed, Lewis and Jacobs (1992) have argued that at middle and upper organizational levels, where nearly all incumbents have proven levels of motivation, interpersonal skills, and technical knowledge, conceptual capability may be the single most important determinant of leader success. In a recent overview of individual differences in leader capability, Fleishman, Zaccaro, & Mumford (1991) arrived at a similar view of the centrality of "cognitive qualities" in leader success. Thus, leader development programs which are serious about preparing their students for future promotions, should be in the business of both systematically assessing and progressively developing students' conceptual capability.

Another implication of the present focus on the centrality of conceptual capability to senior leader success is that the burgeoning literature on managerial "derailment" (Hogan, Raskin, & Fazzini, 1990; McCall & Lombardo, 1983; McCall, Lombardo, & Morrison, 1988) may be placing too little emphasis on conceptual capability in its search for derailment factors. Most of the derailment literature has focused on personality and interpersonal style and related deficiencies of character (Hogan et al., 1990). While clearly important, many managers and leaders may fail not primarily due to their personality characteristics but because they find themselves in over their heads conceptually and can't, therefore, "see" how to add value to the organization at their level.

Research on Leaders' Conceptual Capacity

Recent reviews by Fleishman et al. (1991) and Mumford & Connelly (1991) provide substantial support for the role of leaders' conceptual capacities in leader and managerial effectiveness. Lacking, however, is research explicitly focused upon the differences in leader conceptual capacity which are presumed to be implicated in successful mastery of the key work demands at successive organizational levels. It is to this issue that the present research was directed.

Most of the limited amount of research that has looked explicitly at level of leader capability is grounded in the theoretical writings of Elliott Jaques (Jaques, 1976, 1989; Jaques & Clement, 1991). Jaques begins by focusing on the nature of managerial work, which he defines as the exercise of discretion in pursuit of organizational goals. Noting that in hierarchically configured organizations managerial role demands increase in complexity as one moves up the hierarchy, Jaques asserts that successively higher positions require a successively greater capacity to cope with that complexity. If an individual lacks the capacity to generate the thought processes required to encompass the complexity inherent in his or her work responsibilities, then effective discretion cannot be exercised. In short, the requisite work will not be accomplished, because the individual has not fully grasped the complexity of the key variables and their interrelationships. Following this line of reasoning, Jaques has developed a conception of cognitive complexity (a major component of a broader construct which he terms "work capacity") which is derived from a theory about the nature of

3

environmental complexity rather than ideas about the nature of cognitive complexity per se. This novel approach has led to a theory about the nature and development of conceptual complexity which differs in significant ways from more traditional views of cognitive complexity (Crockett, 1965; Harvey, Hunt & Schroeder, 1963; Kelly, 1955; Streufert & Streufert, 1978; Suedfeld & Tetlock, 1977), which have focused more narrowly on level of cognitive differentiation and degree of integration of discrete cognitive elements. One major difference is the inclusion of time horizon in Jaques' conception of work capacity. Time horizon, which Jaques sees as an individual attribute, is defined as " . . . the longest period into the future within which a person is capable of organizing and carrying through given tasks or projects, handling problems as they arise on the way, and reaching the eventual goal" (Jaques & Clement, 1991, p. 50). The individual attribute called time horizon is linked to an organizational/task attribute termed "time span of discretion," which is the maximum amount of time inherent in the work for task completion (Jaques & Clement, 1991). Higher level managerial tasks typically have longer time spans than do tasks at lower managerial levels. That is, the tasks one works on at higher managerial levels typically take significantly longer to bring to a conclusion than do the tasks encountered at lower managerial levels. Stated in terms of the exercise of discretion, which both Jaques (1989) and Mumford (1986) see as the essence of managerial work, time span is the period of time that must elapse before one can determine if the decisions made in doing the task have been adequate in terms of organizational goals. To be effective, a leader's time horizon must match or exceed the time span of his/her critical tasks. The link between time horizon and cognitive complexity follows from the fact that longer time spans require a frame of reference which can accommodate more distal causal links, causal links that may be less clear because of the operation of a greater number of intervening variables over increasingly long periods of time.

In his earlier writing Jaques seemed at times to equate time horizon with work capacity (Jaques, 1976). A careful reading of his most recent work (Jaques, 1989; Jaques & Clement, 1991) makes it clear that time horizon is only one important feature of work capacity, albeit an important one, partly because it permits relatively straightforward assessment of work capacity in role incumbents. In his recent writings (Jaques, 1989; Jaques & Clement, 1991), Jaques has begun to provide a more complete description of cognitive capacity, one which does not rely as heavily on the concept of time horizon. Instead, he attempts to extract levels of cognitive complexity from his description of the conceptual demands of discrete levels of organizational hierarchy. Using the terms "cognitive power" and "cognitive complexity" nearly interchangeably, Jaques and Clement (1991) indicate that their view of cognitive complexity concerns the various processes by which individuals make sense of the relevant work environment. This shift places Jaques more squarely in the "constructivist" tradition along with the work of Robert Kegan (1982), which will be considered below. Jaques and Clement (1991) describe four hierarchically ordered reasoning processes which, when combined with four orders of complexity with respect to the content that is being reasoned about, yield distinctly different and hierarchically ordered ways of processing information. Although this combination of four thought processes with four levels of information complexity yields sixteen levels of thought, only eight are relevant to the

assessment of managerial capacity. These eight correspond to the eight levels of task complexity identified in Jaques' (1976) theory of organizational hierarchy.

Jaques' Constructivist Theory of Conceptual Capacity

In adopting a constructivist metapsychology, Jaques and Clement (1991) assert that leaders/managers do not respond directly to an objective, real world. Rather they "construct" a cognitive representation of that objective world which organizes it conceptually into a meaningful stimulus to which they then respond. This constructivist position has a growing number of proponents among contemporary managerial and leadership theorists (e.g., Daft & Weick, 1984; Lewis & Jacobs, 1992; Thomas & McDaniel (1990); Walsh, 1988; Weick & Bougan, 1984) and contrasts sharply with the behavioral and trait approaches which have dominated the last 40 years of leadership theory and research (Yukl & Van Fleet, 1992).

From a constructivist perspective, how a leader organizes information is critical. In Jaques' theory this translates into an emphasis on the process of how information is put together rather than an emphasis on the mere complexity of the resulting vision, although the two are related. Jaques also focuses upon the level of abstraction of the information which is being processed, from concrete objects at the lowest level to abstract conceptual models at the highest levels. Jaques (1989) has asserted that most managerial work at the indirect and executive levels requires the processing of symbolic as opposed to concrete information via the use of abstract conceptual models.

Breadth of Perspective and Developmental Level

An additional feature of conceptual level that has been largely neglected by leadership researchers is the capacity of the leader to take a broad view of his or her work environment, relatively unencumbered by narrow self interest or the prevailing mind set of others in the organization. Competent leaders need to be able to take a view of their work that is both broad and objective. Leadership theorists like Kets de Vries (1989) and Torbert (1987) have demonstrated that leadership success is often a function of the sort of breadth of perspective and transcendence of self interest that accompanies personal maturity. In a similar vein, Kuhnert and Lewis (1987) argue that personal maturity is requisite for the exercise of transformational leadership. More recently, Kegan has made a compelling conceptual argument that managerial work requires a level of psychological maturity not found in most adults (Kegan, 1994). Unfortunately, support for the proposition that personal maturity and its related "objectification" of experience underpins leader effectiveness is largely anecdotal. Available research bearing on leader maturity level and its related breadth of perspective are correlational and descriptive. The present author conducted one such study of successful, mid-career military officers (cited in Lewis & Jacobs, 1992).

In Lewis and Jacobs' (1992) study, which focused on the conceptual attributes of mid career military officers enrolled at either the U.S. Army War College or the Industrial College of the Armed Forces, the present investigator assessed the developmental level of an

5

opportunity sample of 48 war college students. Using an assessment approach derived from the work of Robert Kegan and his colleagues at Harvard University (Lahey, Souvaine, Kegan, Goodman, & Felix, 1988) it was determined that only about half of the students sampled had developed a sufficiently broad view of their relationship to their work to be able to view their work environment objectively, that is, to view their work from outside the organizational context within which it was taking place. Fully half were embedded in shared views of their work and could not provide a self-generated perspective on it. To borrow a term from Piagetian theory, half of the study participants were not able to fully "decenter" from someone else's or a collective organizational view of how they were conducting their work lives. Lacking an independent frame of reference for viewing themselves and their work roles, these officers were considered unlikely to be able to provide the sort of leadership which could transform an organization in the face of new and unexpected challenges. And as noted above, the transformation of organizational structures is thought to be an important aspect of executive or strategic level leadership. While these findings were descriptive and did not address leader effectiveness, they do suggest that many highly successful direct leaders may lack the necessary conceptual and personal maturity to deal effectively with higher level, indirect leadership positions. This suggestion was supported by the discovery of a strong relationship ($r = .59$) between breadth of perspective (Kegan's developmental stage level) and conceptual work capacity (Jaques' conceptual complexity). A more complete summary of this research is presented below.

Summary of Historical Background

To summarize the above literature review, leadership researchers and theorists alike have come to recognize that the critical tasks of senior level leaders and military officers are quite different from the critical tasks of individuals occupying lower level leadership positions. Forced to operate in a complex and rapidly changing environment, senior leaders must be able to develop a comprehensive conceptual understanding of their work environment and the world at large. It is this broad understanding which allows them to shape rather than react to unfolding events through the establishment of policy, standards and climate, and to be able to provide effective simultaneous coordination of diverse but interrelated organizational functions. What appears to be central to success at these higher levels of organizational leadership is the capacity to cognitively structure relevant information in a broad, objective, and complex fashion. Unfortunately, the bulk of prior research on leader effectiveness has focused either on differences in managerial "style" or on component decision making processes. Landy and Trumbo's (1980) literature review revealed that leader style and personality differences have not generally been found to be related to leader effectiveness. One can be an effective leader using a variety of personality styles. And while recent research has increased our understanding of effective decision making processes (c.f., Klein, Orasanu, Calderwold, & Zsambok, 1993; Schon, 1983), this body of work has not addressed individual differences in decision making capacity. A major thrust of the present review is that individual differences in conceptual capacity are highly relevant to leader effectiveness, particularly at upper organizational levels. It was these differences in individual capacity which were the focus of the current research project.

Preliminary Research by the Present Investigator

Under the auspices of the National Research Council and the U.S. Army Research Institute for the Behavioral and Social Sciences, the present investigator conducted a preliminary investigation of the conceptual capacity of an opportunity sample of 48 war college students. The primary theoretical focus of the research was upon the breadth of perspective of the study participants. Breadth of perspective was assessed using an interview approach developed by Robert Kegan and his colleagues at Harvard University (Lahey et al., 1988). The interview, which was modified slightly to focus upon experiences in the work environment, yields a judgement about the extent to which the interviewee is able to decenter from and take a broad perspective on narrower frames of reference. The interview is described more fully below.

Kegan has identified six major levels or "stages" in the developmental progression from a narrow, sensory-based perspective found in infancy, to a broad, transcendent perspective found (only rarely) in late adulthood. Most American adults function at Kegan's fourth stage ("interpersonalism"), which is characterized by the use of shared or "co-constructed" frames of reference (Kegan, 1982, 1994). These frames of reference are co-constructed in the sense that the person using such a frame incorporates an external standard or perspective as part of his or her own view. Such a frame of reference is thought to require the capacity to hold two perspectives in mind simultaneously (one's own view in relation to the external point of view) and is thus more structurally complex than the single perspective frames of reference characteristic of information processing at the next lower stage (Kegan's third stage - "imperialism"). Progression to the next (fifth) stage, "institutionalism," entails the construction of a personally authored set of standards and principles that one can bring to bear on the shared perspectives of the previous stage. Achievement of this fifth stage imparts a capacity for independent thought unconstrained by shared or consensus views of reality. These individuals are able to think about rather than thinking within shared points of view. It is in this metacognitive sense that these fifth stage individuals are broader thinkers than individuals at the interpersonalism, co-constructing stage. The internalization of personal standards and values at the higher stage also imparts a greater psychological distance from the shared frames characteristic of individuals at the next lower stage, thereby imparting greater objectivity about what others or the organization thinks and expects.

The interview approach designed to assess Kegan's (1982) developmental levels (herein termed "breadth of perspective") entails asking the interviewee to describe and then comment upon recent experiences which have evoked strong emotional reactions. The broadest frames of reference the interviewee uses in making sense of his or her emotionally significant experiences become the basis for arriving at an overall stage score. Using scoring categories based on theoretically derived developmental stages (Kegan, 1982) and points of transition between stages (Lahey et al., 1988), interviewees can be scored as functioning at one of Kegan's stages or at a developmental transition point between two stages. Using this assessment method, it was discovered that only slightly more than half (52%) of the sample

7

of 48 war college students had achieved Kegan's fifth stage, the stage characterized by the capacity to take an independent, self-authored perspective on ongoing events and experiences. The remainder of the subjects were found to be at Kegan's fourth stage ("interpersonalism") or in transition beyond that stage.

A popular questionnaire measure of personality style (the Myers-Briggs Type Indicator, Myers & McCauley, 1985), was found to be unrelated to breadth of perspective, and correlations with each of the eight Myers-Briggs scales ranged from -.19 to .15. And while several leader development practitioners had predicted a positive correlation between breadth of perspective and the Myers-Briggs Intuition scale (T. O. Jacobs, personal communication), that correlation was virtually zero ($r = -.03$). These findings are interpreted as further evidence that personality style and conceptual capacity (here breadth of perspective) are unrelated. Indeed, from a constructivist point of view, there is little reason to expect a significant link between personality structure (how information is processed) and personality content (what is processed, Blasi, 1976). Knowing an individual's personal preferences and style (i.e., personality content) tells us little about the level of sophistication with which that person structures their experience (i.e., personality structure). And it is the latter which may be centrally implicated in leader effectiveness (Lewis & Jacobs, 1992; Lucas & Markessini, 1993).

For twenty-eight of the subjects who were assessed for breadth of perspective using Kegan's interview, a further assessment of conceptual capacity was conducted by T. O. Jacobs. Using a variation of Gillian Stamp's interview measure of Jaques' levels of work capacity (Stamp, 1986), Jacobs assessed each participant's current conceptual level. Because most of these war college students had successfully completed a battalion command, and because battalion command is considered by Jaques (1989) to be at the highest direct leadership level, it was expected that all would demonstrate thinking processes characteristic of Jaques' level III (linear, analytic thought). As expected, Jacobs' assessments revealed that the lowest functioning subjects among the 28 he assessed ($N = 8$), were at the top of Jaques' level III. A larger group ($N = 16$) showed the conceptual capacity needed to handle leadership demands at Jaques' fourth level, the first level of indirect leadership. These individuals presumably already had the conceptual capacity needed to do the work of a brigade commander, which would be their next leadership position, were they to be subsequently selected for command. The remainder ($N = 4$) demonstrated the capacity to think about work using conceptual processes that Jaques believes are needed for leadership roles at the fifth level of organizational complexity. In short, Jacobs found that nearly two thirds of these highly selected war college students already had the conceptual capacity needed to add value at the organizational level beyond battalion command and a few even had the capacity to function effectively two levels above their most recent leadership position.

Because work capacity, as assessed using the modified Stamp interview, is empirically related to managerial career progression (Stamp, 1988), its relationship to breadth of perspective was assessed. Achievement of the capacity to take a broad, self-authored

8

perspective on one's work experiences (Kegan's fifth stage) should impart an advantage in decision making, particularly in the sorts of complex and uncertain environments that face most middle and upper level organizational leaders, and this advantage should positively impact one's career progression. As reported elsewhere (Lewis & Jacobs, 1992), a Pearson product-moment correlation of .59 was obtained between the two measures. This statistically significant relationship was considered to be particularly noteworthy given the limitations in interrater reliability for the work capacity and breadth of perspective measures which are reported below. Even more striking was the pattern of the relationship revealed in a scatter plot of the two variables (see Figure 1). With only one exception, all subjects who were assessed at Kegan's fifth stage also demonstrated a high Jaques' work capacity. And of the 16 subjects with the highest work capacities (mid level IV and higher), only two had not achieved Kegan's fifth stage. It should be emphasized that these two variables are conceptually distinct, were assessed using highly different methods, and were independently assessed by two researchers (Jacobs and Lewis) each of whom was "blind" to the other's assessments. Together with the restricted range of the two sets of scores (from high level III to mid level V on the Jaques measure and from Kegan's fourth to fifth stages), the correlation obtained (.59) is surprising. One possible interpretation of this finding is that there may be a structural capacity that underlies both breadth of perspective and conceptual work capacity. Another possibility is that one must achieve a certain breadth of perspective before one can develop the capacity to handle highly complex managerial work. Indeed, the pattern of results revealed in Figure 1 suggests that, with a few exceptions, unless one has attained a breadth of perspective that is fully self authored (Kegan's "institutional" stage), a high level of work capacity will not be present. Stated more specifically, embeddedness in shared perspectives (a characteristic of those at Kegan's "interpersonalism" stage and in transition out of that stage) may preclude the development of a complex, interconnected view of one's work tasks. At a minimum, this relationship deserves further investigation, and was a major focus of the present research.

TECHNICAL OBJECTIVES

Proposed was a systematic replication and extension of the previous research on the conceptual capacity of mid career military officers. Specific objectives included the following:

1) Replication of the previous finding that the breadth of perspective of war college students can be reliably assessed using a modification of the Kegan subject-object interview

2) Replication of the previous finding that only about half of those officers selected to attend a resident war college have developed to Kegan's fifth stage (the "institutional" stage)

3) Establishment of the reliability of the Jacobs/Jaques/Cason version of the Stamp methodology for assessing conceptual work capacity

9

FIGURE 1

Scatter Plot of the Relationship Between
Breadth of Perspective and Conceptual Work Capacity Scores
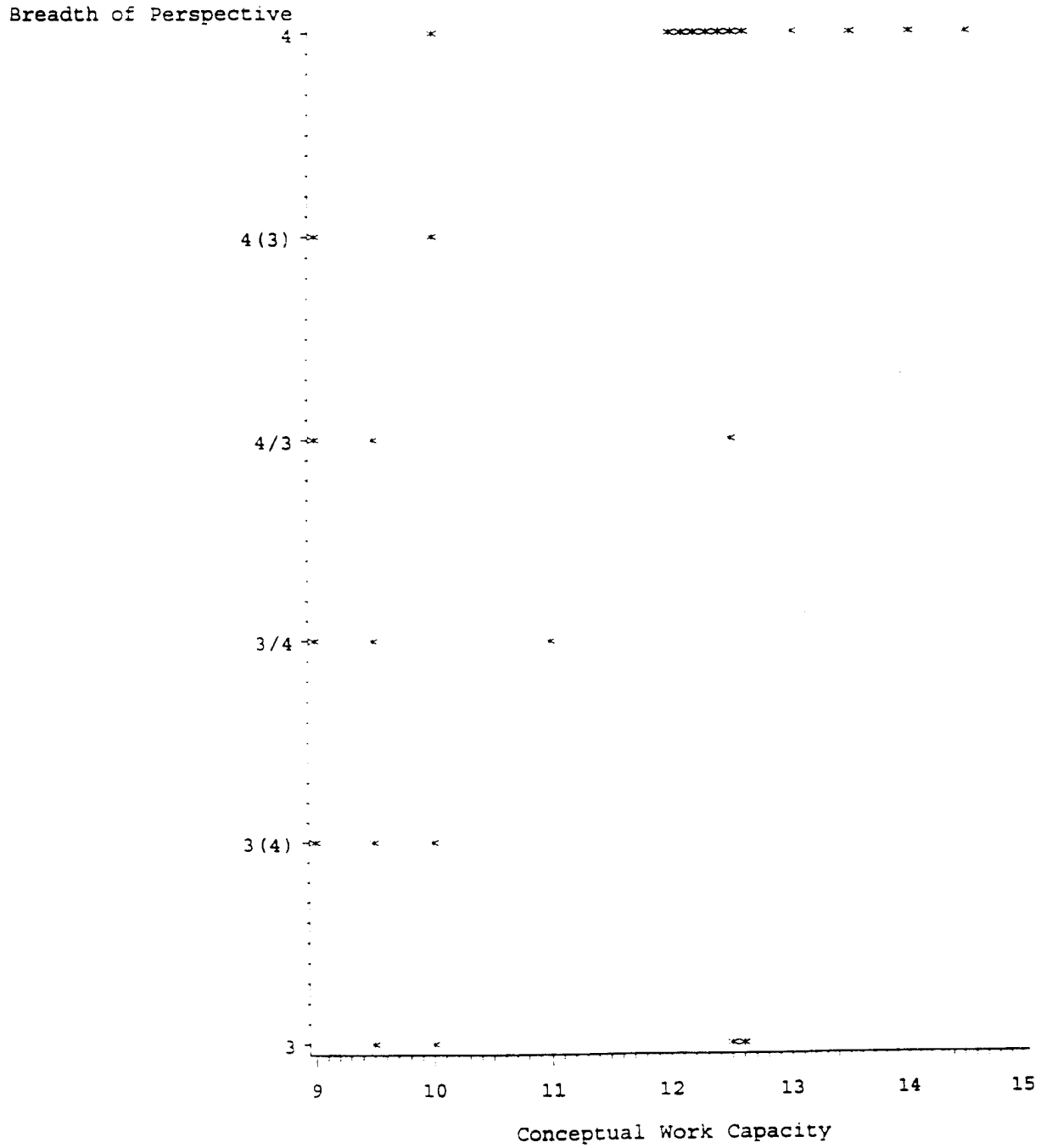
Lewis & Jacobs (1992)

4) Replication of the relationship between breadth of perspective and conceptual work capacity

5) Establishment of the interrater reliability of Jaques' new narrative assessment method for assessing conceptual work capacity

6) Exploration of Jaques' thinking process construct as a possible link between breadth of perspective and conceptual work capacity

7) Development of an instructor rating measure of students' strategic thinking performance for use as a partial criterion measure for validating the predictive validity of the conceptual capacity measures

Each of the technical objectives was intended to advance basic understanding of the conceptual capacities thought to be requisite for leader effectiveness at middle and upper organizational levels.

METHOD

Overview

The conceptual capacity of an opportunity sample of 44 war college students was assessed during the first six months of their attendance at either the U.S. Army War College (N = 38) or the Industrial College of the Armed Forces (N = 6). Each participant was assessed for conceptual capacity using three interview-based methods: a) a variation of Robert Kegan's subject/object interview (Lahey et al., 1988), b) a variation of Gillian Stamp's procedure for the assessment of conceptual work capacity (Stamp, 1986), and c) an exploratory narrative analysis method currently under development by Kathryn Cason and Elliott Jaques (personal communication). All assessments were conducted by the principal investigator (Philip Lewis) and interrater reliabilities were assessed by having up to 20 of each interview independently scored by subject matter experts. In addition, where available, war college students' Myers-Briggs Type Indicator (MBTI) scores (Myers & McCaulley, 1985) and Kirton Adaptation-Innovation Inventory (KAI) scores (Kirton, 1987) were obtained. Finally, for war college subjects enrolled in one of six seminar groups, instructor ratings of strategic thinking skill, general officer potential, and peer popularity were obtained (N = 37).

Measures

Breadth of perspective interview. Breadth of perspective was assessed using an interview procedure developed by Robert Kegan and his colleagues at Harvard University (Lahey, et al., 1988). Kegan's interview protocol was modified slightly for use in the present research by focusing on the interviewee's current and most recent work roles. The assessment began with an invitation for the interviewee to try to recall instances at work

11

where he or she had experiences related to the following words or phrases: angry, anxious/nervous, success, strong stand/conviction, sad, torn, moved/touched, lost something, change, and important to me. Rather than verbalize the experiences recalled, the interviewee was asked to jot down a few notes to assist in remembering the details of the incidents and was told that some would become the focus of the upcoming interview. After the interviewee finished jotting down these notes (which were only for the interviewee's own use during the interview), the interviewee was invited to begin talking about any one of the incidents recalled in whatever way he or she wished. At this point the interactive interview began and was audiotaped. After a description of the incident was obtained, the interviewer asked a series of "why" questions (e.g., "Why did you feel sad?") designed to elicit the frame of reference used by the interviewee in attaching meaning to the experience being described. Thus, the focus of the interview was not on the "content" of the incident but instead on the way in which the interviewee made sense of the incident (i.e, the "structure" of the interviewee's thought). It was the level of self-differentiation expressed in the structuring of the meaning of the incident that was subsequently scored. "Limit testing" questions were used by the interviewer to insure that the interviewee had expressed a frame of reference for attaching meaning to the incident that he or she could not subordinate to a broader frame of reference. When the interviewer was satisfied that this limit had been reached, discussion of the first incident ended and the interviewee was invited to talk about another. In this manner several recent (within the past year or two) incidents at work which had evoked an emotional response were explored. When the interviewer judged that enough material had been elicited to produce a scorable protocol (typically the exploration of three or four incidents), the interview was terminated. Interviews typically lasted between 60 and 75 minutes.

Scoring the breadth of perspective interview. Each audiotaped interview was converted to a typescript and all identifying information removed. The typescripts were then scored in accordance with criteria set forth in The subject/object interview: A guide to its administration and analysis (Lahey et al., 1988). This manual is based on the developmental theory of Robert Kegan (1982). Each time the interviewee clearly articulates his or her frame of reference for attaching meaning to a personally relevant event, that frame of reference is scored at one of five stages of the differentiation of self from "object" or at a transition point between two stages. One of four successive transition points between any two stages are scored when features of both stages are present. At the lowest transition point between any two stages the interviewee is able to state a rudimentary, global critique of the frame of reference of the lower stage, but that critique is structurally consistent with the frame of the lower stage. Next come two transition points where the broader frame of reference of the higher stage is articulated but always in conjunction with the frame of reference of the lower stage. At the lower of these two transition points the narrower perspective takes precedence, at the higher transition point the broader perspective takes precedence in the interviewee's meaning making. At the highest transition point between any two stages, the frame of reference of the higher stage is always evident and always encompasses the narrower frame of reference, but the interviewee articulates concerns about regressing to an embeddedness in the developmentally earlier frame of reference. Based on

12

prior research with war college students (described briefly above), it was expected that most, if not all, war college students would demonstrate meaning making structures at Kegan's fourth or fifth stages (labeled stages 3 and 4, since Kegan's first stage is labeled stage 0) or in transition between them. Thus, stage scores from the breadth of perspective interview were expected to be 3, 3(4), 3/4, 4/3, 4(3), and 4 in the current study. Because the Kegan interview procedure is unfamiliar to most readers, examples of interview excerpts scored at stages 3 (interpersonalism) and stage 4 (institutionalism) will be briefly illustrated.

As defined by Kegan (1982), the operative frame of reference for individuals at his fourth stage ("stage 3" - interpersonalism) always includes as part of one's own frame of reference another, external frame. These two perspectives are cognitively joined and are taken simultaneously (e.g., my thinking about myself in terms of how I think someone else is thinking about me). Consider the following example from the present investigator's previous war college research:

> (The interviewee responds to a question from the interviewer as to why he felt an obligation to come home from work each night at an agreed upon time.) "Well, I felt, you know, that's a deal I made with her (his wife), and I was gonna live up to it even though it had lost its emphasis and its value (because they were often prevented by circumstances from eating supper together). It wasn't the fact that we were eating supper together so much at this point. Then it became (quoting his wife) 'Just be there. If I've got to kill a cockroach, I'd like to have a man there so I don't have to kill it myself.' It's just the fact that the man that's supposed to be there. It'd be nice for him to be there every now and then."

In this brief interview excerpt the interviewee tells how he constructs his understanding of needing to be home in the evening not in terms of his own independent valuing of togetherness (which would reflect the broader frame of reference of the next higher stage). Rather, he successively makes two different external views of his obligations a part of his own sense of obligation (thus holding two perspectives simultaneously). The first external view is his wife's expectation that he be there ("Just be there."), which he makes a part of his own felt obligation to be home at supper time. The second external view is a sort of societal expectation regarding traditional gender roles ("...the man that's supposed to be there.") that he also makes part of his own sense of obligation. Both reflect a frame of reference characterized by a psychological embeddedness in shared expectations, by definition the hallmark of Kegan's fourth stage, interpersonalism.

In contrast, individuals at Kegan's fifth stage ("stage 4 - institutional") attach meaning to their experiences by using frames of reference that transcend shared expectations. These individuals demonstrate the capacity to apply independently constructed values or standards to their ongoing experiences. Consider the following excerpt of a war college student who was scored at Kegan's fifth stage:

13

(The interviewee is responding to a question about why he feels a responsibility to do a good job.) "I think I continually assess how I'm doing, as far as - living up's not the right term. There are certain principles, certain values that I have voiced to other people that I really believe that I believe. And I go through an assessment process where I take stock of myself and say, 'How are you doing, and how have things been going?' I feel a responsibility to perform. And that's something I put on myself. It's not like people are over my shoulder saying, 'You gotta do such and such.' So, in that sense I'm just . . . , its a matter of making sure that how I'm conducting myself, my life, the things I'm doing, remain consistent with the values I hold."

Not only does this individual articulate a self-constructed frame of reference for assessing meaningfulness (the hallmark of Kegan's fifth stage - institutionalism), she also explicitly critiques the narrower, co-constructed meaning framework characteristic of Kegan's stage of interpersonalism ("Its not like people are over my shoulder saying, 'You gotta do such and such.').

The Kegan interview procedure is lengthy (60 to 90 minutes), requires substantial training to administer and score, and requires additional resources to transform an audiotape into a typescript (typically 7 to 10 hours per interview). For this reason it has not been widely used, and data concerning its reliability must be considered to be only preliminary. Nonetheless, Lahey et al. (1988) reported on over 250 interviews with adults (primarily individuals in the 20 to 40 year age range). Interrater reliabilities ranged from .75 to .90. In one doctoral dissertation a test-retest reliability of .83 was reported, though the time interval was not reported (cited in Lahey et al., 1988).

Conceptual work capacity interview. Gillian Stamp, a former colleague of Elliott Jaques at Brunel University in London, developed a procedure for assessing an individual's cognitive capacity to perform complex managerial work. This assessment procedure, termed "Career Path Appreciation" (CPA) by Stamp (1986), has its conceptual roots is Elliott Jaques' theories about the nature of work complexity in bureaucratic organizations (Jaques, 1976; 1989). As outlined above, Jaques identified eight levels of work complexity, which he termed "strata." Corresponding with each of these strata of work complexity, Jaques identified discrete levels of individual conceptual work capacity for processing that complexity. Of most relevance to the present research are the levels of conceptual processing considered by Jaques to be requisite for the recent and future leadership demands of mid career military officers. According to Jaques (1989), Company command is at organizational stratum II, Battalion command at organizational stratum III, Brigade command at organizational stratum IV, and Division command at organizational stratum V. The levels of information processing considered requisite for each leadership stratum are level II, cumulative processing, where data are accumulated to support or refute various propositions; level III, serial processing, where information can be processed in terms of linear, cause and effect sequences; level IV, parallel processing, where multiple linear sequences can be processed simultaneously, and level V, conceptual processing, where data are organized into

14

discrete abstract concepts or models that subsume linear and parallel organizational and extra-organizational processes. The CPA was designed by Stamp to detect these levels of capacity.

The CPA assessment interview is divided into three parts: phrase cards, symbol sort and work history. These will now be briefly described. The first part of the interview centers upon the interviewee's reactions to nine sets of phrase cards. The interviewee is invited to read the phrases typed on six three by five cards and decide for each set of cards which phrase is most like and which is least like how he/she prefers to approach a piece of work. Each phrase is thought by Stamp to reflect most closely the thinking process characteristic of one of six of Jaques' levels of conceptual work capacity. For illustrative purposes, the first set of phrase cards is shown below, listed in ascending order of conceptual capacity:

Level	Phrase
I	Work to a complete set of instructions
II	Work within a given framework
III	Work with connections even if particular links are unclear
IV	Work in abstracts and concepts
V	Work with a minimum of preconceptions
VI	Define the horizons of the work

(Stamp, 1986)

Though work capacity levels are shown above for each phrase, level of conceptual work capacity is not determined solely by the interviewee's choice of most preferred phrase. The interviewee is invited by the interviewer to elaborate on or explain his/her preferences. The way in which the phrase is understood by the interviewee is given as much weight as the presumed conceptual level of the phrase chosen in determining conceptual level. The way in which the interviewee goes about looking at the six phrases (sequentially, all at the same time, etc.) and interrelating them (if at all) is also used in making a judgement about conceptual level.

The second part of the CPA interview centers upon a concept formation task (Bruner, 1966) consisting of symbol cards which the interviewee is asked to sort one at a time into four piles, trying to discover in the process an a priori sorting rule. As the subject proceeds through the sorting task, the interviewer indicates whether each card has been correctly sorted into one of three pre-labeled piles and gives no feedback if the card is sorted into an unlabeled fourth pile. The interviewee is told that the object of the task is to discover the interviewer's sorting rule and to sort ten consecutive cards into the correct piles. Each sorting card contains from one to three geometrical symbols which vary by number, size, shape, and color. The correct solution involves jointly using two of the four variables. By observing the interviewee's sorting decisions, the interviewer can infer the way in which the interviewee goes about testing complex hypotheses. When the interviewee has solved the task (or it is clear he or she will not be able to do so), the interviewer asks the interviewee to

explain how they went about trying to solve the task. Because the task requires the use of hypothetical reasoning and the formulation and testing of complex hypotheses, individuals who have not yet reached Jaques' level III of conceptual capacity are typically not capable of solving it. Those at Jaques level III often solve the task using a trial and error approach. Those who are at Jaques level IV or higher are able to articulate a systematic problem solving strategy which makes use of the blank (unlabeled) pile in hypothesis testing.

The third and final portion of the CPA interview is a work history where the interviewee is asked to describe the major work positions he/she has held, starting with the earliest major work position. The complexity and maximum time span of the work done in each position is noted, and the interviewer asks questions to assess the interviewee's level of comfort with that level of work complexity at the time the position was held. Because conceptual work capacity has been found to increase at a typical rate (Stamp, 1988), it is thought to be possible to extrapolate from past work capacity to current (and future) work capacity using progression curves developed by Jaques (Jaques, 1989). Finally the interviewee is asked about his or her current time horizon, since Jaques (1976, 1989) has found time horizon to be correlated with conceptual work capacity.

On the basis of responses to all three parts of the CPA interview, an overall score is assigned which reflects the interviewee's current conceptual work capacity expressed in terms of Jaques' levels (I through VI). Within each level of work capacity, distinctions among high, medium, and low expressions of that level are also made. Stamp (1986) did not report interrater reliabilities for CPA derived scores. However, in a recent study conducted by the current author (Lewis, 1993) interrater reliability for 57 war college students was found to be .81. Given the "quasi-clinical" nature of the assessment interview, and the fact that only one of the two scorers (T.O. Jacobs) had face-to-face contact with those assessed (Lewis assigned a score from a typed record of the interview), a Pearson correlation of .81 was considered a very acceptable level of interrater agreement.

The thinking process interview. During the past several years Elliott Jaques, with the assistance of Kathryn Cason, has been developing a procedure for assessing conceptual work capacity by scoring the thinking processes revealed as individuals discuss complex social issues (personal communication). As noted above, Jaques and Clement (1991) have tried to spell out the successively more sophisticated ways that individuals of progressively higher capability go about processing complex information about work. At the level of ordinary organizational work, there are considered to be eight such levels of information processing (corresponding to eight organizational strata). These eight qualitatively different conceptual processes result from the combination of four different types of thinking processes with two different levels of abstraction. The four successively more sophisticated types of thought processes are as follows:

> **Type 1 - Assertive Processing:** Organizes information and pulls
> it together in the form of direct association and assertions
> relevant to the immediate situation

Type 2 - Cumulative Processing: Reasons by accumulating possibly significant pieces of information through time and organizing them in relation to each other so as to be able to combine them into a conclusion or decision

Type 3 - Serial Processing: Reasons by putting information together in a linear, serial form (e.g., a progressive, cause and effect story, algorithm, or decision tree) leading through time to predicted future events

Type 4 - Parallel Processing: Reasons by organizing information into a number of separate serial processes and then dealing with the information in each process in parallel with the others, establishing interrelationships among the processes as necessary

The second dimension of thinking processes is the order of abstraction at which relevant information is cognitively represented (termed "order of information complexity"). And whereas Jaques and Clement (1991) have hypothesized there to be four of these, only two are considered to be relevant to ordinary managerial work. The first order of complexity entails the use of words and symbols to represent objects and events. This is the level of ordinary discourse about the real world. The second order of complexity entails the use of abstract conceptual models where the models themselves do not refer directly to concrete objects or events in the real world. This level of abstraction concerns a kind of second order set of concepts about concepts. For example, the business concept of balance sheet value is a second order concept. It must be decomposed into such first order variables as expenditures, revenue, assets, etc. before it can be tied directly to actual objects or events. Jaques and Clement assert that certain levels of managerial work can only be fully grasped through the use of second order thought. Most adults are believed to process information at the first order of thought. Few are thought to have the capability to regularly process information at the second level of abstraction.

When the two levels of abstraction are combined with the four successively more complex thinking processes, eight levels of thinking or information processing result. Every individual is presumed to have attained a particular level of thinking and is expected to rely on that mode of thinking when the work environment is sufficiently complex and challenging. It is these eight thought processes that are considered to be the key components of the capability levels which are assessed using the CPA. The so-called thinking process interview is Jaques and Cason's attempt to directly assess these processes.

At the time the present research was conducted (1991-92), the interview method for eliciting scorable thinking processes was still being developed by Jaques and Cason. Their guidance for the current research was that the thinking process assessment interview be structured as follows: Interviewees were invited to think about a current issue about which they had both a strong opinion and about which they had done considerable thinking. Two examples were suggested to them as to the kind of issues that they might want to discuss:

17

women in combat and downsizing in the military. But interviewees were encouraged to describe an issue that they personally found to be engaging. Once they had selected an issue, the interviewee was asked to describe the issue and their views on it for about ten to fifteen minutes. Jaques and Cason suggested that since interviewees would be describing an issue of personal high interest, it would not be necessary for the interviewer to probe or challenge the interviewee's arguments.

Jaques and Cason (personal communication) reported that they had independently scored twenty thinking process interviews and that their level of agreement was "high." But because the specific characteristics of the eight levels of thinking processes were still being developed using a kind of "bootstrapping" methodology, independence of the scores of the two raters was occasionally violated, so precise interrater agreement statistics were not computed. Clearly, the Jaques/Cason thinking process assessment method can only be considered exploratory at this point.

Instructor ratings of strategic thinking skill and general officer potential. To provide construct validity for each of the conceptual capability measures used in the present research project, war college instructor ratings of study participants were obtained. The peer comparison procedure developed by McAnulty (1990) was modified for use in the present research, because it forces respondents to make distinctions among all individuals being rated. An additional advantage of the paired comparison procedure is that it is less susceptible to rater bias than are dimensional rating procedures (Saal, Downey, & Lahey, 1980). In particular, by forcing raters to make comparisons of each pair of students, indicating which is superior on the attribute being rated, leniency bias is eliminated.

Use of war college instructors to rate strategic thinking skill was thought to be appropriate for several reasons. First, war college instructors have considerable first-hand knowledge of how their students express ideas about complex issues. The principle educational method at both the U.S. Army War College and the Industrial College of the Armed Forces is discussion of issues in small (N=16) interactive seminar groups, where the seminar members are responsible for presenting and debating a variety of complex social, military, and political issues. Topics and instructors change approximately every eight weeks, but the groups typically retain their membership for half the academic year. Thus, more than one instructor has in-depth experience with the participants in any given seminar group, experience of the sort that should make it possible for the instructors to confidently rate their students' thinking skills.

Subjects

Subjects were 44 resident students at either the U.S. Army War College (N=38) or the Industrial College of the Armed Forces (N =6). One GS 14 DoD civilian participated; the remainder of the participants were mid-career military officers at lieutenant colonel or colonel ranks (or equivalent). There were two U.S. Coast Guard officers, one U.S. Marine, four U.S. Air Force officers, and one Army National Guard officer. The remainder were

U.S. Army officers. Selection as a military officer for a war college resident course is highly competitive. and all participants are considered to be within the top 10% in terms of their past performance as military officers. With only a few exceptions, all war college officers have been or will shortly be promoted to the rank of full colonel or its equivalent, and virtually all have had a successful battalion command or its equivalent. In short, war college students are a highly select group.

The 44 participants in the present study were all invited to participate by seminar group instructors who were familiar with the present investigator's research into leader capability. Of the six instructors who recruited participants, five were at the U.S. Army War College, and one at the Industrial College of the Armed Forces. In all, approximately 78 war college students were invited to participate. It is not known how the study participants differed from those who chose not to participate. The instructors who recruited participants stressed that participants would receive feedback from the investigator regarding personal attributes related to leadership, so it is possible that the participants were more interested in gaining additional self knowledge than were non participants. In any event, it can not be assumed that the participants in the present study were representative of military officers who attend senior service schools.

Procedure

War College students who volunteered to participate were contacted by phone and a 90 minute interview scheduled. Interviews were scheduled in empty classroom or office space on the war college campuses. When study participants arrived for the interview, the purposes of the research were explained and written informed consent obtained. All participants then participated in the breadth of perspective interview. At the end of the interview they were given brief and general feedback about their interview performance and were scheduled for a second 90 minute interview, typically within two weeks of their initial interview. At the second session, the CPA interview was conducted and was followed immediately by the thinking process assessment. Finally, each participant was again given brief and general feedback about their performance and was invited to ask questions about the research project. All breadth of perspective and thinking process interviews were conducted by the present investigator and were completed between 30 October 1991 and 24 February 1992. Two other interviewers, T.O. Jacobs and H. Barber, conducted six CPA assessments of participants who were unable to be scheduled by the present investigator. CPA interviews were never able to be scheduled for three study participants who missed or cancelled interview appointments and never rescheduled.

Each U.S. Army War College (USAWC) participant was asked to provide his or her Myers Briggs Type Indicator (MBTI) scores and Kirton Adaption-Innovation Inventory (KAI) scores to the investigator, since the USAWC does not retain students' individual test scores. Twenty-six of the 38 USAWC study participants provided their scores. For the six Industrial College of the Armed Forces participants, the investigator obtained their consent to secure their test scores from the college. All had MBTI scores on file. and four had KAI scores.

Thirty-three of the 38 USAWC participants were members of one of five seminar groups. The current instructors of those five seminars were asked to provide instructor ratings of three attributes of eight of the fourteen U.S. members of their seminar group, including all of the military study participants who were group members. There were from five to eight study participants in each of these six seminar groups. To standardize the instructor rating process, where there were less than eight study participants in a seminar group, other members of the seminar group were randomly selected to be included in the ratings, though their ratings were not used in the present research. In addition, another instructor from each of the five USAWC seminar groups was recruited to provide the same paired comparison ratings of these 33 study participants. Five study participants from one of three other USAWC seminar groups were not rated by their instructors. All six participants from the Industrial College of the Armed Forces (ICAF) were rated by an instructor familiar with the present research project (B. Michelson). Because this was an elective seminar, there was no other instructor who had this particular group of students, so a second set of instructor ratings was not obtained for these students. All instructors were asked to make judgements about the relative capability of eight members of their seminar group with respect to "strategic thinking skill" and "general officer potential." No definitions of these two attributes were given to the instructors. To provide a measure with some hypothesized divergent validity for the conceptual capacity measures, instructors were also asked to rate each of the eight seminar group members' popularity with their peers using the same paired comparison procedure.

Interrater Reliabilities

All interviews were audiotaped and the tapes were later converted to typescripts for subsequent scoring. Twenty breadth of perspective interview transcripts were selected at random and forwarded to Dr. Lisa Lahey for independent scoring. Dr. Lahey is the first author of the scoring guide that was used to score these interviews (Lahey et al., 1988) and can be considered an expert in the scoring of the breadth of perspective interview. Lahey determined that six of these interviews could not be definitively scored, and the present investigator concluded that an additional interview from among the twenty could not be definitively scored by him. For the thirteen that both raters definitively scored, the Pearson correlation between the present investigator's and Lahey's scores was .92.

Although seven of the twenty interviews could not be fully scored by Lahey, six were considered partially scorable by both raters. That is, each subject's statements from the interview were judged to be indicative of a minimum breadth of perspective, even though it was judged that the individual's maximum capacity had not been fully tested. Here there was additional agreement between Lahey and the present investigator. For four of the seven, both raters agreed that the student was at minimum in transition between interpersonalism and institutionalism. For another, Lewis considered the individual to be fully at the self-authoring, institutional stage while Lahey scored the interview as showing a predominance of the institutional stage but still possibly showing that the student was sometimes subject to taking a more narrow, interpersonal perspective. The sixth interview was judged entirely

20

unscorable by Lewis. while Lahey judged that this student was at minimum well into the transition from interpersonalism to institutionalism. In all, 36 of the 44 breadth of perspective interviews were considered fully scorable by the present investigator and will be included in the data analyses reported below. The issue of unscorable interviews will be commented upon more fully below.

T.O. Jacobs independently scored eleven of the 41 CPA interviews. For these eleven interviews both Jacobs and Lewis scored the CPA performance for each subject from a typed record of the phrases portion of the interview, a computer generated record of each subject's symbol sorts, and the interviewer's notes on the work history. The interrater agreement between Jacobs' scores of current conceptual level and those of the present investigator was .81, using a Pearson correlation coefficient. This level of interrater agreement was considered acceptable and was identical to that obtained in a subsequent war college study using the scores from 57 USAWC students in the class of 1993.

Twenty thinking process interviews were selected at random and sent to Jaques and Cason for the purpose of establishing interrater reliability. Each thinking process interview was to be scored as illustrating one of the eight thinking processes identified by Jaques and Clement (1991) and described above. If more than one thinking process was revealed in the monologue, the typescript was to be scored at the highest level on the assumption that each more sophisticated thinking process encompasses all less sophisticated thought processes (i.e., less complex processes are present in the transcript as the building blocks for more complex processes). When Jaques and Cason attempted to score the thinking process interviews for level, they concluded that the interviews were not scorable. Their conclusion was that the interviewees were not sufficiently engaged to be able to infer maximum thinking process level. Jaques and Cason indicated that their advice to the present investigator regarding how to conduct the interviews had been inadequate. Unfortunately, by the time this was determined, the war college students had graduated and were not available for re-interviewing.

Discussion of Unscorable Interviews

The reader will note that using both the breadth of perspective and thinking process interviews, some unscorable interviews were obtained. Because this phenomenon is not typical using most assessment interviews, an explanation of why this occurred in the present research is offered here. Both the breadth of perspective interview and the thinking process interview are derived from constructive/developmental theories of human cognition. This theoretical orientation is based on the premise that the most fundamental human cognitive activity is the construction of meaning. People are not thought to perceive an objective real world. Instead, people are seen to actively organize the stimulus properties of the external world into some meaningful whole and then respond to that internally constructed stimulus, not the objective stimulus (Jaques & Clement, 1991; Kegan, 1982). If an investigator is interested in assessing the nature of this organizing process, then it is essential that the assessment methodology allow the person being assessed to operate upon or "construct"

meaning in a fashion that demonstrates that process. Of necessity, this requirement rules out the use of "objective" assessment approaches where the assessor provides both the stimulus (usually a test item) and the response options (usually a set of possible responses provided by the test developer). The free response format of an interview permits the interviewee to convey his or her own view or "construction" of the issue of interest.

But even though the constructivist framework suggests the utility of free response assessment approaches, it does not suggest why it might be difficult to score the free responses obtained for achieved developmental level. In fact, it is the developmental portion of the constructive/developmental framework that makes assessment most problematical. In constructive/developmental theories, each shift in understanding (i.e., developmental stage) results in a more complex view of experience which subsumes all simpler views. Because each shift in perspective or stage subsumes or encompasses each developmentally earlier perspective, these earlier perspectives continue to be present. And whereas the individual is capable of relativizing or subsuming simpler perspectives or processes to broader and more complex ones, this only occurs when the complexity of the stimulus being organized demands it. Thus, people with relatively broad and complex ways of constructing their experience of the world may not always do so. This creates a challenge for the assessor who is interested in determining the person's highest level of development. To be assured that the person's upper limits have been tested, the assessor must interactively challenge the person to reconstruct any perspective presented in an even broader or more complex fashion. When the person is unable to do so, then his or her highest developmental level has presumably been detected. Failure to adequately test the person's limits can result in an unscorable interview. This is what happened in certain instances in the present research and is a common risk when a constructive/developmental approach is utilized. Still, the present investigator believes that this risk is worth the potential payoff: a theoretical approach that has real promise for capturing the complexity of human information processing. Less theoretically and methodologically demanding approaches to human understanding have not yielded a substantial increase in our understanding of what distinguishes leaders of real capability from those who seem not to be equal to the conceptual demands of complex leadership tasks (Lewis & Jacobs, 1992).

RESULTS

Breadth of Perspective

In previous research by the present author (Lewis & Jacobs, 1992), it was found that half (50%) of the 28 war college students studied demonstrated the capacity to fully exercise a personally authored perspective on key events in their work lives. The remaining students were either still at Kegan's interpersonalism stage (Kegan, 1982) or in transition from interpersonalism to Kegan's self-authored stage (institutionalism). The present research afforded another look at the breadth of perspective of an additional war college sample, again using a modification of the Kegan interview (Lahey et al., 1988). Results were generally similar to those of the previous research. Of the 36 scorable interviews, 20 (56%) were

scored by the present investigator as demonstrating full achievement of Kegan's institutional stage. One individual was scored at Kegan's interpersonal stage and 15 (42%) were in transition from interpersonalism to institutionalism (from Kegan's stage 3 to Kegan's stage 4). As in the previous research, no war college students demonstrated the narrow self-interested perspective of Kegan's imperial stage (stage 2). Similarly, no student in either sample showed signs of beginning a transition to Kegan's final developmental stage, the interindividual stage (stage 5). This distribution of breadth of perspective scores is consistent with a view of the military as demanding that officers transcend narrow self interest in the pursuit of broader, organizational goals. The narrowly "careerist" orientation of some individuals is viewed quite negatively in the military, and from a constructive/developmental perspective those officers who have a limited capacity to see their mission from the Army's perspective (those not fully at the interpersonal stage or higher) do not seem to have performed well enough to be selected for one of the war colleges. Of course, it is possible that a few such individuals are selected for resident War College study, but if there are any, they seem not to have volunteered for the present or previous research studies. The distribution of breadth of perspective scores is shown in Figure 2.

Even though over half of the study participants had achieved Kegan's institutional stage (stage 4), and none showed even vestiges of a narrow, self-interested perspective (Kegan's imperial stage, stage 2), it is nonetheless noteworthy that there were still a substantial proportion of War College students (42%) who had not yet developed the capacity to decenter from shared perspectives and operate from an entirely self-authored and self-directed point of view. Arguably (Lewis & Jacobs, 1992), the capacity to step back from and independently evaluate the perspectives offered by others or the organization itself is essential to the decision making requirements of higher level leadership positions. Forty-two percent of the present participants were judged not fully capable of exercising that level of independent judgement. This should make their potential contributions to the military at higher ranks following War College graduation problematical. Fortunately, all but one of these individuals was already in transition toward the stage characterized by independent judgement (stage 4). It might be argued, however, that the seven individuals scored at the transition labeled "3(4)" (see Figure 2) might have considerable difficulty quickly completing the transition. These individuals do not yet show any evidence of constructing their own, self-authored perspectives on their work. Instead, they have merely internalized the external expectation that they should do so. Unfortunately, they may well have consolidated a relatively stable developmental position, one supported by a military culture which, at upper ranks, puts a premium on independent decision making (Lucas & Markessini, 1993). These individuals may have learned how to "talk the talk" of independent thinking without being able to "walk the walk."

Conceptual Work Capacity

The second variable of interest in the present research was war college students' assessed conceptual work capacity (Jaques, 1977, 1989). According to Jaques, individuals differ in their capacity to conceptually grasp and manage complex managerial and leadership

FIGURE 2

Distribution of
Breadth of Perspective Scores

24
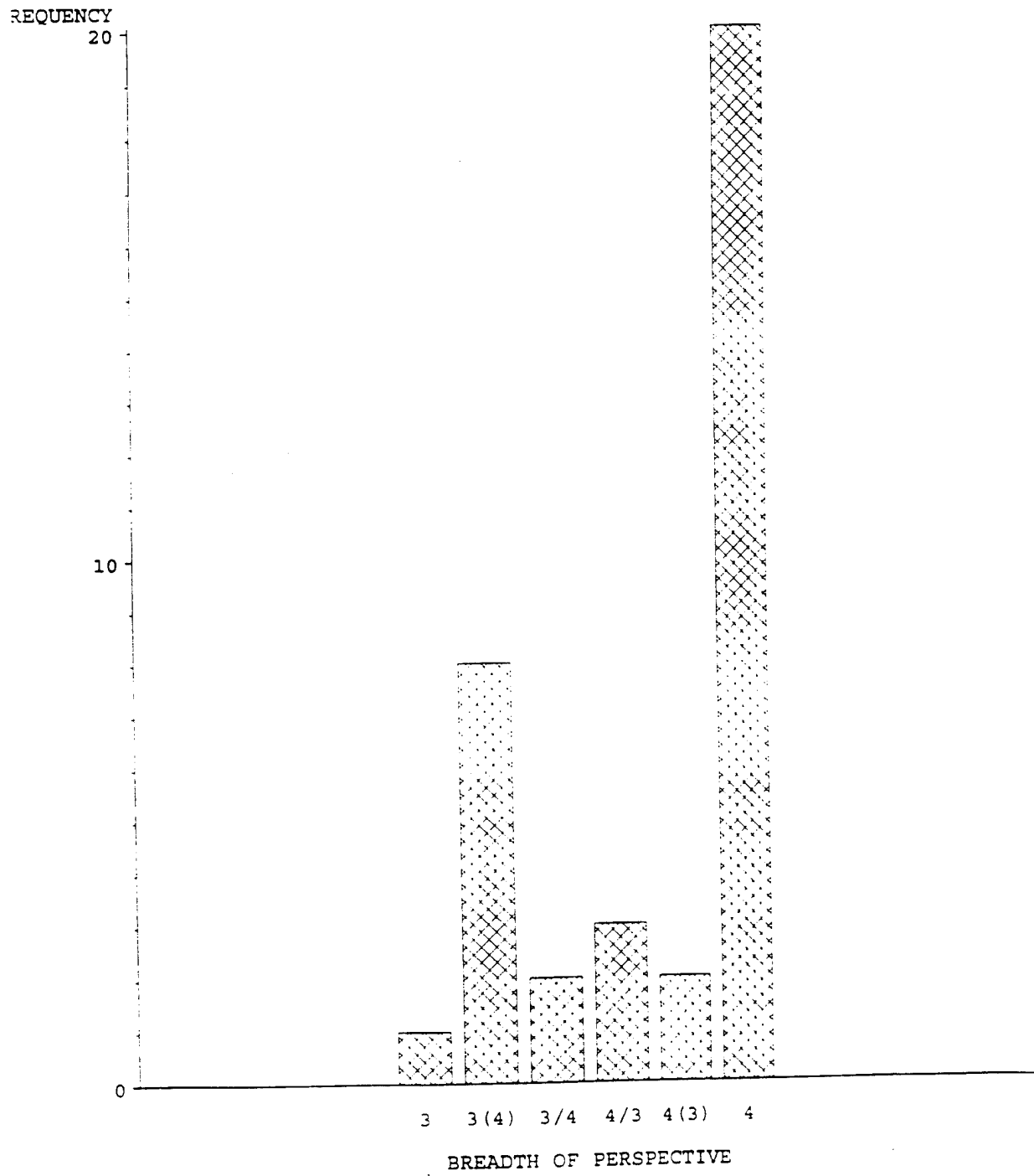
role responsibilities. Jaques (1977, 1989) claims to have identified a discrete number of these qualitatively distinct yet hierarchically ordered levels of conceptual capacity, levels which correspond to associated strata of work complexity. Individuals who are assigned work responsibilities at an organizational stratum for which they lack the requisite conceptual capacity will presumably find it difficult to successfully carry out the most complex (and often the most critical) requirements of their job. What is lacking in these individuals is not relevant knowledge or experience but the capacity to construct mental models of the work which match its complexity. In short, the individuals cannot "see" the work that they need to be doing, and often are observed to be trying to do the work of their subordinates (Lewis, in press).

In the present study, the conceptual capacity of an opportunity sample of 41 war college students was assessed using a variation of the CPA method developed by Stamp (1986). Of particular interest is the extent to which the conceptual work capacity of these individuals matches or exceeds the conceptual requirements of the leadership positions to which they can be expected to move after graduation from the war college. Virtually all of these war college students had completed successful battalion commands or an equivalent leadership position. According to Jaques (1989), battalion command is at the top of organizational stratum III in its complexity. Therefore, war college students would be expected to demonstrate a conceptual work capacity at or above level III. These students' next work assignments can be expected to be at organizational stratum IV (brigade command) or in support of brigade command or higher. Jaques' stratified systems theory predicts that to be successful in these subsequent positions, war college graduates will need to be able to conceptualize their work at level IV or higher. Findings from the present research were interesting in this regard. All 41 war college students who were assessed with the CPA were found to be at conceptual work capacity level III or higher. Of these 22% were determined to be functioning at level III with another 7% at the transition between level III and level IV. This 29% of the sample will presumably be marginal, at best, in their ability to conceptually grasp the work complexity of their future leadership positions, unless the demanding war college curriculum improves their level of capability (the impact of the war college experience on students' conceptual capability has never been directly assessed). Fortunately, 71% of the current sample demonstrated the capacity to grasp and master work complexity at Jaques' level IV or above. Ten percent of these (N=8) had already moved beyond level IV in their conceptual capacity. These are the individuals who would be in the best position to move rapidly into division level positions upon their graduation from the war college. This distribution of conceptual work capacity scores is presented in Figure 3.

Relationship Between Breadth of Perspective and Conceptual Work Capacity

In previous research into the conceptual capability of war college students, a strong relationship between Kegan's breadth of perspective and Jaques' conceptual work capacity scores was demonstrated (Lewis & Jacobs, 1992). One purpose of the present investigation was determination of the replicability of that finding in a study which assessed the reliability of both assessments (in the previous research no reliability assessment of the CPA instrument

FIGURE 3

Distribution of
CPA Scores

Distribution of Conceptual Work Capacity Scores

26
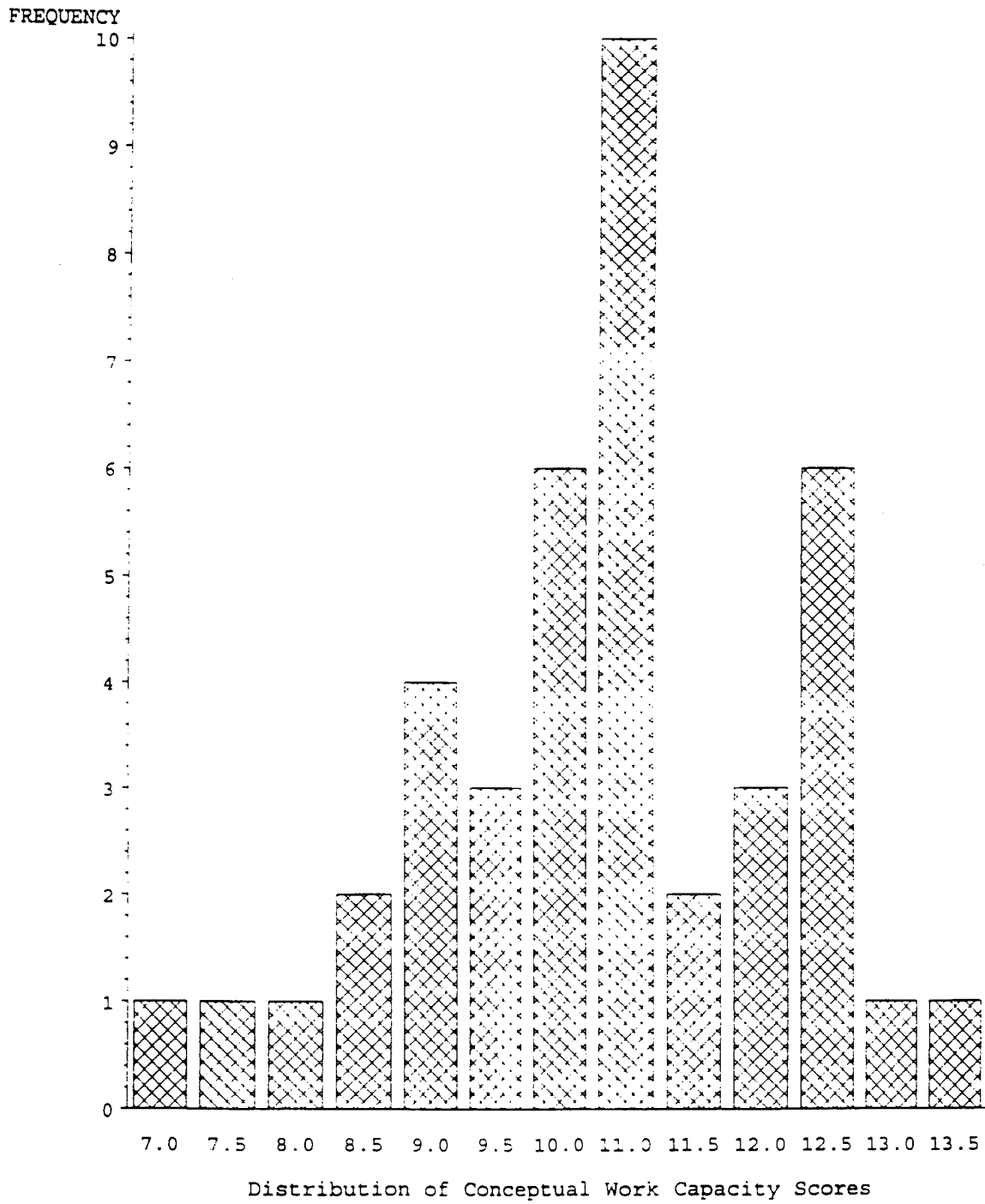
was available). Accordingly, a Pearson product-moment correlation was calculated between breadth of perspective scores and conceptual work capacity scores for the 34 subjects who had valid scores on both assessments. The obtained correlation was .46. The scatter plot of this statistically significant relationship ($\underline{df}$ = 32, $\underline{p}$ < .01) is presented in Figure 4. Inspection of this plot suggests that the pattern of the relationship between the two variables is highly similar to that obtained in the previous research (see Figure 1). As in the previous study, those participants who were found to have the most complex thinking processes (Jaques high level IV and level V) were almost all shown to have the capacity for independent thought. The reverse was not as clear cut. There were a number of independent thinkers (Kegan's stage 4) who did not demonstrate particularly high levels of conceptual work capacity. What is striking in these results is not only that the relationship between the two assessments was replicated but that the form of the relationship was also. One possible explanation for the lower obtained correlation in the present investigation (.46 here versus .59 in the previous study) is that there were considerably fewer participants at the highest CPA levels (high level IV or above) in the present study than there were in the previous study. In the present study only 10 of the 34 participants (29%) who obtained valid scores on both interview assessments were at the upper CPA levels, while in the previous study 15 of the 28 participants (54%) with both scores were found to be at these higher levels (high level IV or level V).

Instructor Ratings

Recall that 39 of the 44 participants in the present study were rated by one or two of their war college instructors for "strategic thinking skill," "general officer potential" and "peer popularity." These ratings were intended to provide evidence of the convergent and discriminant validity of the constructs underlying the interview assessments. For 33 of the 38 U.S. Army War College participants instructor ratings were obtained from 2 instructors who had extensive contact with each participant. The level of agreement among the two sets of instructor ratings were calculated and were found to modest, at best. Pearson correlations of ratings of strategic thinking skill, general officer potential, and peer popularity between leadership instructors and military science instructors were .57, .23, and .37 respectively. Given these low levels of interrater agreement, relationships of instructor ratings with assessed conceptual work capacity were calculated separately for each type of instructor. For the leadership instructors (five at the U.S. Army war college and one at the Industrial College of the Armed Forces) the following Pearson correlations were obtained: The relationship between CPA assessed conceptual work capacity and instructor ratings of strategic thinking skill, general officer potential, and peer popularity were .39, .47, and .05 respectively. For the U.S. Army War College military science instructors the same correlations were .41, .27, and -.23. Together these correlations provide modest convergent validity for the CPA measure. Instructor rated strategic thinking skill, as demonstrated in war college seminar groups, and instructor rated general officer potential are both positively correlated with assessed conceptual level. At the same time, instructor rated peer popularity is not positively correlated with CPA assessed conceptual level. And although the above correlations are modest, it seems likely that the obtained relations were attenuated by the

27

FIGURE 4

Scatter Plot of the Relationship Between
Breadth of Perspective and Conceptual Work Capacity Scores

Breadth of Perspective

Conceptual Work Capacity

28
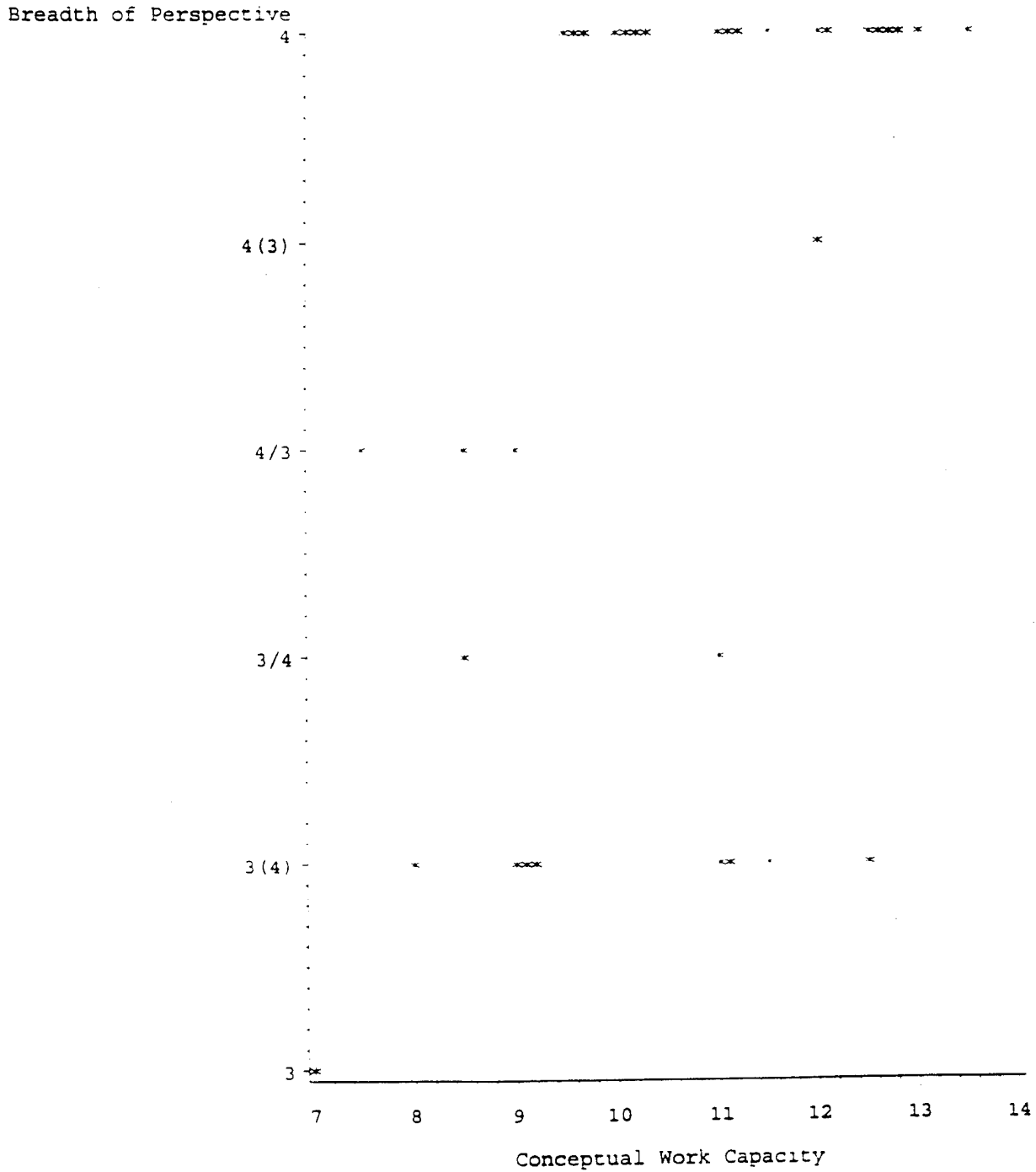
relatively low reliabilities of the measures. Interestingly, breadth of perspective (assessed using the Kegan interview) was uncorrelated with leadership instructors' ratings of strategic thinking skill (r = .12, $\underline{df}$=34, p >.05). This finding is consistent with the earlier reported finding that being an independent thinker (Kegan's stage 4) does not necessarily predict that one will demonstrate a high level of conceptual work capability.

Although not a major focus of the project, the relationship of the interview-based assessments of conceptual level were correlated with scores on two questionnaire measures of personality style (the Myers-Briggs Type Indicator and the Kirton Adaption-Innovation inventory). The current investigator has argued elsewhere (Lewis & Jacobs, 1992) that normal personality variation is unrelated to leader effectiveness. It follows, therefore, that if conceptual capability is related to leader effectiveness, then conceptual capability and personality may also be unrelated. In other words, individuals of a variety of personality styles should show a full range of conceptual capability. To assess this proposition, the correlations among the Kirton, Myers-Briggs, Kegan, and Jaques scores were examined. These correlations are presented in Table 1.

Inspection of Table 1 suggests that questionnaire measures are unrelated to breadth of perspective, as assessed using the Subject/Object interview (Lahey et al., 1988), but that those same measures are significantly correlated with conceptual work capacity, as assessed using the CPA methodology. Specifically, those individuals who were the most innovative thinkers were likely to be assessed as using more complex thought processes. And those individuals who were more intuitive and thinking oriented on the Myers Briggs Type Indicator also tended to use more complex thought processes. All three personality dimensions, adaption-innovation, sensing-intuition, and thinking-feeling, were significantly intercorrelated in this particular sample.

DISCUSSION OF RESULTS

In attempting to make sense of the present findings it should be emphasized that they were obtained from an highly usual group of individuals. All participants in the present project were war college students and were, with one exception, military officers. All had served with distinction in the military or federal government for approximately 20 years, and with two exceptions, all had completed successful tours as battalion commanders. All but two were male, and they occupied a narrow age cohort (42 to 49 years old). Finally, all had agreed to participate, without any external incentives, in a series of interviews that required about three hours of their time. In short, participants in the present study were very homogeneous, particularly with respect to their work socialization and employment histories. It is important. therefore, that the present findings not be cavalierly generalized to other groups of individuals.

One major focus of the present effort was the attempt to replicate provocative findings from the principal investigators's earlier war college research (cited in Lewis & Jacobs, 1992). In the main. the earlier findings were confirmed. Both of the methods used in the

Table 1

Intercorrelations Between Myers Briggs Type Indicator (MBTI), Kirton Adapton-Innovation (KAI), Career Path Appreciation (CPA) and Subject/Object Level (S/O) Scores for 36 U.S Army War College Students

	MBTI[1] E-I	MBTI N-S	MBTI F-T	MBTI P-J	KAI	CPA
S/O LEVEL	.162	.291	-.377	.269	.293	.461*
MBTI E-I		-.021	-.227	-.001	.322	.280
MBTI N-S			-.028	.478*	.609**	.580**
MBTI F-T				.243	-.469*	-.404
MBTI P-J					.430	.265
KAI						.632**

[1] Higher score indicates preference for MBTI attribute listed first

*p< .01
**p< .001

earlier research for assessing conceptual capacity were found to have acceptable levels of interrater agreement. And conceptual work capacity, as assessed using the CPA, was found to have some concurrent validity. In particular, CPA scores were significantly correlated with two different sets of instructors' ratings of participants' strategic thinking skill. As expected, conceptual work capacity was not significantly correlated with instructors' ratings of participants' popularity with their peers. These findings provide modest support for the convergent and discriminant validity of the CPA as a measure of conceptual work capacity in a military context. Also reconfirmed was the earlier finding that only about half of the war college students studied had fully advanced to Kegan's stage of full psychological independence (Kegan's "institutional" stage). Although the importance of attaining this level of perspective taking to senior leader success was not examined in the present study (all participants had been successful leaders in the past), Kegan and others (Kegan, 1994; Torbert, 1983; Drath, 1989) have made a strong case for its importance.

Given that there is at least modest evidence that the CPA assesses individuals' capacity to conceptualize varying levels of work complexity, the fact that nearly all the individuals in the current study who showed high levels of conceptual work capacity were also found to be developmentally mature is an intriguing finding. In trying to make sense of this finding, now replicated, it is useful to begin with a consideration of what was not demonstrated. First, it does not seem to be the case that achievement of Kegan's stage of psychological self definition (the "institutional stage") in and of itself conveys a high level of conceptual capacity. Inspection of Figure 3 indicates that there were eleven individuals who were judged to be independent thinkers who were not found to be functioning at the highest conceptual levels (here defined as high level IV or higher on the CPA). Conversely, only two individuals who had not achieved Kegen's institutional stage were found to be conceptually complex, and one of these was at the last transition point in his development to the institutional stage. This individual used the self defined standards typical of Kegan's "institutional" stage in judging the meaning of his work encounters, but he also expressed concerns that he might be drawn back into judging events in terms of shared frames of reference (characteristic of Kegan's "interpersonal" stage). Interestingly, the other individual who was assessed at a high level of conceptual work capacity (at the transition between level IV and level V) was found to be functioning at the first scorable transition point beyond Kegan's interpersonal stage. This is the point where the individual has embraced the idea that he must be an independent thinker but has done so because he perceives that this is the Army's expectation of its officers. Hence, the "thinking for oneself" is structurally co-determined (what I think the Army thinks I should be doing) rather than being wholly self constructed (just thinking for myself).

Interpretation of this pattern of results remains difficult. At the outset of this project it was hoped that the Jaques/Cason thinking process analysis might reveal a common thread between Kegan's breadth of perspective assessment and the CPA's conceptual work capacity assessment. Unfortunately faulty guidance regarding how to conduct the thinking process assessments resulted in narratives that were largely unscorable. This leaves open various avenues for the interpretation of these findings. One possibility is that both Kegan's breadth

of perspective and Jaques' conceptual work capacity, at the point where the individual is developing a self-authored perspective (Kegan's 5th stage) and conceptual modeling (Jaques' level V thought), are dependent on a common structural development. Kegan's fourth stage ("interpersonalism") requires the capacity to hold two perspectives in mind simultaneously (e.g., being able to think about yourself in terms of what someone else is thinking about you). Similarly, Jaques' level IV thought ("parallel processing") requires that the individual be able to simultaneously track two or more ongoing work processes and conceptualize their interconnections. Thus, developing beyond Kegan's interpersonalism and beyond Jaques' level IV thought requires the capacity to take a perspective on parallel or simultaneous thought processes. Jaques focuses on the shift to the use of conceptual models, which are no longer directly tied to concrete aspects of work. Kegan focuses on the use of self defined standards and values to prioritize shared perspectives and expectations. But both share the structural feature of developing the capacity to transcend parallel thought. This would explain the substantial positive correlation between CPA scores and Kegan stage level scores despite the strikingly different assessment methods used (see above for a description of the two assessment approaches). In short, it may be the case that self-defined individuals and high level thinkers process information in a fashion that is qualitatively different from the way individuals at developmentally lower levels process information. Only the content differs. Kegan focuses on the processing of complex self-relevant information, while Jaques' focuses on the processing of information about complex work environments. Because complex self-relevant information is nearly universal, while complex work environments are not, this could explain why all individuals who are self defining are not necessarily conceptual thinkers with respect to their work environments.

One implication of the foregoing analysis is that it should be substantially easier to develop high levels of conceptual thinking in individuals who are already functioning at Kegan's fifth stage of development than it would be in individuals who have not yet reached that stage. Because these individuals have already developed patterns of thinking that are requisite for conceptual thought, they merely need to be placed in appropriately complex work environments for their conceptual work capacity to develop. Confirmation of this proposition would necessitate a comparison of the growth of conceptual work capacity of war college graduates who were independent thinkers versus those who were not. The former should show the most rapid gains in conceptual work capacity. Given the relatively short periods between promotion to full colonel and general officer ranks, this could prove to be a key component in the assessment and development of strategic leader potential at senior levels.

REFERENCES

Bennis, W. G., & Nanus, B. (1985). Leaders: The strategies for taking charge. New York: Harper & Row.

Bentz, V. J. (1987). Explorations of scope and scale: The critical determinant of high level executive effectiveness (Tech. Rep. No. 31). Greensboro, NC: Center for Creative Leadership.

Blasi, A. (1976). Concept of development in personality theory. In J. Loevinger (Ed.), Ego development (pp. 29-53). San Francisco: Jossey-Bass.

Bray, D. W., Campbell, R. J., & Grant, D. L. (1974). Formative years in business: A long-term AT&T study of managerial lives. New York: Wiley-Interscience.

Bruner, J. (1966). Toward a theory of instruction. New York: Norton.

Crockett, W. H. (1965). Cognitive complexity and impression formation. In B. A. Maher (Ed.), Progress in experimental personality research: Volume 2 (pp. 47-90). New York: Academic Press.

Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretive systems. Academy of Management Review, 9, 284-295.

Drath, W. H. (1990). Managerial strengths and weaknesses as a function of the development of personal meaning. The Journal of Applied Behavioral Science, 26, 483-499.

Forsythe, G. B., Horvath, J. A., Sweeney, P. J., McNally, J. A., Wattendorf, J. M., Williams, W. M., and Sternberg, R. J. (1995, April). Tacit knowledge for military leadership. Paper presented at the meeting of the American Educational Research Association, San Francisco, CA,

Fleishman, E. A., Zaccaro, S. J., & Mumford, M. D. (1991). Individual differences and leadership: An overview. Leadership Quarterly, 2, 237-243.

Harvey, O. J., Hunt, D. E., & Schroder, H. M. (1961). Conceptual systems and personality organization. New York: Wiley.

Hogan, R., Raskin, R., & Fazzini, D. (1990). The dark side of charisma. In K. E. Clark & M. B. Clark (Eds.), Measures of leadership (pp. 343-354). West Orange, NJ: Leadership Library of America.

Isenberg, D. J. (1985). Some hows and whats of managerial thinking: Implications for future leaders. In J. G. Hunt & J. D. Blair (Eds.), Leadership on the future battlefield. New York: Pergamon.

Jacobs, T. O., & Jaques, E. (1987). Leadership in complex systems. In J. Zeidner (Ed.), <u>Human productivity enhancement. Volume 2: Organizations, personnel, and decision making.</u> New York: Praeger.

Jacobs, T. O., & Jaques, E. (1990). Military executive leadership. In K. E. Clark & M. B. Clark (Eds.), <u>Measures of leadership</u> (pp. 281-295). West Orange, NJ: Leadership Library of America.

Jacobs, T. O., & Lewis, P. (1992). Leadership requirements in stratified systems. In R. L. Phillips & J. G. Hunt (Eds.), <u>Strategic leadership: A multiorganizational-level perspective</u> (pp. 15-25). Westport, CT: Quorum Books.

Jaques, E. (1976). <u>A general theory of bureaucracy.</u> Portsmouth, NH: Heinemann Educational Books.

Jaques, E. (1989). <u>Requisite organization: The CEO's guide to creative structure and leadership.</u> Arlington, VA: Cason Hall.

Jaques, D., & Clement, S. D., Rigby, C., & Jacobs, T. O. (1986). <u>Senior leadership performance requirements at the executive level</u> (Research Rep. No. 1420). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD B103 760)

Katz, D., & Kahn, R. L. (1966). <u>The social psychology of organizations</u> (1st ed.). New York: Wiley.

Kegan, R. (1982). <u>The evolving self: Problem and process in human development.</u> Cambridge, MA: Harvard University Press.

Kegan, R. (1994). <u>In over our heads: The mental demands of modern life.</u> Cambridge, MA: Harvard University Press.

Kelly, G. A. (1955). <u>A theory of personality: The psychology of personal constructs.</u> New York: Norton.

Kets de Vries, M. F. R. (1989). Leaders who self destruct: The causes and cures. <u>Organizational Dynamics, 17,</u> 4-17.

Klein, G. A., Orasaun, J., Calderwold, R., & Zsambok, C. E. (1993). <u>Decision making in action: Models and methods.</u> Norwood, NJ: Ablex.

Kirton, M. J. (1978). Adaptors and innovators: A description and measure. <u>Journal of Applied Psychology, 61,</u> 622-629.

Kirton, M. J. (1987). <u>KAI Manual</u> (2nd ed.). Hatfield, UK: Occupational Research Centre.

Kuhnert, K. W., & Lewis, P. (1987). Transactional and transformational leadership: A constructive/developmental analysis. Academy of Management Review, 12, 648-657.

Lahey, L., Souvaine, E., Kegan, R., Goodman, R., & Felix, S. (1988). The subject/object interview: A guide to its administration and analysis. (Available from the Harvard Graduate School of Education, Cambridge, MA 02138)

Landy, F. J., & Trumbo, D. A. (1980). Psychology of work behavior (Rev. ed.). Homewood, IL: The Dorsey Press.

Lewis, P. (1993). Career path appreciation data reduction and analysis (Tech. Rep. No. 983). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A273 225)

Lewis, P. (in press). Transformational change using stratified systems theory. International Journal of Public Administration.

Lewis, P., & Jacobs, T. O. (1992). Individual differences in strategic leadership capacity: A constructive/developmental view. In R. L. Phillips, & J. G. Hunt (Eds.), Strategic leadership: A multiorganizational-level perspective (pp. 121-137). Westport, CT: Quorum Books.

Lord, R. G., DeVader, C. L., & Alliger, G. M. (1986). A meta-analysis of the relation between personality traits and leadership perceptions: An application of validity generalization procedures. Journal of Applied Psychology, 71, 402-410.

Lucas, K. W., & Markessini, J. (1993). Senior leadership in a changing world order: Requisite skills for U.S. Army one- and two-star assignments (Tech. Rep. No. 976). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A269 891)

McAnulty, D. M. (1990). Development of a peer comparison procedure for the U.S. Army aviation officer advanced course (Research Rep. No. 1549). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A219 898)

McCall, M. W., Jr., & Lombardo, M. M. (1983). Off the track: Why and how successful executives get derailed (Tech. Rep. No. 21). Greensboro, NC: Center for Creative Leadership.

McCall, M. W., Jr., Lombardo, M. M., & Morrison, A. M. (1988). The lessons of experience: How successful executives develop on the job. Lexington, MA: Lexington Books.

Mintzberg, H. (1973). The nature of managerial work. New York: Harper & Row.

Mumford, M. D. (1986). Leadership in the organizational context: A conceptual approach and its application. Journal of Applied Social Psychology, 16, 508-531.

Mumford, M. D., & Connelly, M. S. (1991). Leaders as creators: Leader performance and problem solving in ill-defined domains. Leadership Quarterly, 2, 289-315.

Myers, I. B., & McCaulley, M. H. (1985). Manual for the Myers-Briggs Type Indicator: A guide to the development and use of the MBTI. Palo Alto, CA: Consulting Psychologists Press.

Saal, F. E., Downey, R. G., & Lahey, M. A. (1980). Rating the ratings: Assessing the psychometric quality of rating data. Psychological Bulletin, 88, 413-428.

Schon, D. A. (1983). The reflective practitioner. San Francisco: Harper Collins.

Simon, H. A. (1977). The new science of management decision. Englewood Cliffs, NJ: Prentice-Hall.

Stamp, G. (1986). Listening to my story has been really interesting: A guide to career path appreciation. Unpublished manuscript, Brunel Institute of Organisation and Social Studies, Brunel University, Uxbridge, Middlesex.

Stamp, G. (1988). Longitudinal research into methods of assessing managerial potential (Tech. Rep. No. 819). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A204 878)

Streufert, S., & Streufert, S. C. (1978). Behavior in the complex environment. Washington, DC: Winston and Halstead Div., Wiley.

Suedfeld, P., & Tetlock, P. E. (1977). Integrative complexity of communications in international crisis. Journal of Conflict Resolution, 21, 169-184.

Tichy, N., & De Vanna, M. (1986). Transformational leadership. New York: Wiley.

Torbert, W. (1987). Managing the corporate dream. Homewood, IL: Dow Jones-Irwin.

Walsh, J. P. (1988). Selectivity and selective perception: An investigation of manager's belief structures and information processing. Academy of Management Journal, 31, 873-896.

Weick, K. E., & Bougan, M. G. 91986). Organizations as cognitive maps. In H. P. Sims, Jr., & D. A. Gioia (Eds.), The thinking organization (pp. 102-135). San Francisco: Jossey-Bass.

Yukl, G., & Van Fleet, D. D. (1992). Theory and research on leadership in organizations. In M. D. Dunnette & L. M. Hough (Eds.), Handbook of industrial and organizational psychology, Volume 3 (pp. 147-197). Palo Alto, CA: Consulting Psychologists Press.